

MEETINGS

Exploring the Deep Biosphere: Probing Microbial Systems at Earth's Extremes

Exploring Subseafloor Life With the Integrated Ocean Drilling Program, Vancouver, British Columbia, Canada, 3-5 October 2006

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Deep drilling of marine sediments and oceanic crust offers a unique opportunity to explore how life persists and evolves in the Earth's deepest subsurface ecosystems. Resource availability deep beneath the seafloor may impose constraints on microbial growth and dispersal patterns that differ greatly from the surface world. Processes that mediate microbial evolution and diversity may also be very different in these habitats. Communities in parts of the deep subsurface may resemble primordial microbial ecosystems, and may serve as analogues of life on other planets that have, or once had, water. In short, the deep biosphere is one of the least explored biomes on Earth and deserves intense exploration.

The Integrated Ocean Drilling Program (IODP) provides tremendous opportunities to understand the abundance, activity, diversity, and limits of deep-ocean subsurface microbial communities. The workshop "Exploring Subseafloor Life With IODP" was convened to solicit recommendations and guidance on scientific issues

and technical challenges for exploring microbial life in the deep subseafloor. The 90 participants included molecular biologists, microbiologists, microbial ecologists, geologists, biogeochemists, drilling experts, and engineers.

Daily breakout sessions focused on four key scientific areas: (1) biogeography; (2) genes, cells, populations, and communities; (3) habitability; and (4) technology:

- **Biogeography:** Four aspects were determined particularly important. The first is a thorough characterization of deep subsurface habitats and their microbiota. Second, spatial and temporal controls on diversity need to be explored. Third, we need to know the mechanisms and rates of evolution under potentially slow growth, low predation, and severe energy limitation conditions. Finally, the extent to which the deep biosphere is generally connected to the surface biosphere is unclear.

- **Genes, cells, populations, and communities:** It is recommended that microscopic observations of sediment and rocks be expanded to include modern cell-staining procedures. Applying molecular microbial

ecology methods will determine overall genetic potential as well as link this potential to gene function and expression.

- **Habitability:** The geological and biological processes that control habitable environments and that fuel growth of microbial communities in deep subseafloor environments remain to be determined, but the most important parameters can be modeled with appropriate field measurements. Discovery of the limits to life and habitability in these environments should be pursued by using a variety of potential signatures, such as metabolic and enzymatic activities, RNA, and intact polar lipids.

- **Technology:** The primary technology objective is to assure that a specific regimen of coring and sampling handling will be maintained to facilitate microbiological characterization. The participants recommended establishing an IODP microbiological standardized sampling protocol through appropriate modifications of existing sampling and analytical protocols. All data generated as part of this standardized sampling should be integrated with the existing IODP database structure.

The workshop was cosponsored by IODP Management International and Joint Oceanographic Institutions, Inc. A full meeting report will be available in the near future at <http://www.iodp.org>.

The full text of this meeting report can be found in the electronic supplement to this *Eos* edition (http://www.agu.org/eos_elec/).

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M E E T I N G A N N O U N C E M E N T S

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■ 11–14 September 2007 **Space Plasmas and Astrophysics International Workshop in Honor of André Mangeney**, Meudon, France. Sponsor: Observatoire de Paris-CNRS-LESIA. (Conference Secretariat; Fax: +33-1-4507-2806; E-mail: contact.wam@obspm.fr; Web site: http://www.lesia.obspm.fr/Workshop_Andre_Mangeney/)

The workshop will address the different subjects that André Mangeney has worked on during his scientific career. Topics include collisionless plasmas, stellar and solar physics, and astrophysical fluids in general.

■ 24–27 September 2007 **Solar Extreme Events 2007 (SEE 2007): Fundamental Science and Applied Aspects**, Athens, Greece. Sponsors: Committee on Space Research (COSPAR); Hellenic Physicists Association; European Space Agency (ESA); others. (Conference Secretariat, National and Kapodistrian University of Athens, Faculty of Physics, Department of Nuclear and Elementary Particle Physics, Athens, Greece 15771; Tel.: +30-210-727-6890; Fax: +30-210-727-6987; E-mail: see_ihy_2007@phys.uoa.gr; Web site: <http://cosray.phys.uoa.gr/SEE2007/index.htm>)

SEE 2007 will focus on solar, heliospheric, and magnetospheric aspects related to solar extreme

events in 2005 and 2006. Topics include energetic processes on the Sun, worldwide particle detector networks for space weather research, and integrated space weather warning and forecast systems.

■ 15–17 October 2007 **Joint International Grace Science Team Meeting (GSTM) and Deutsche Forschungsgemeinschaft (DFG) Symposium**, GFZ-Potsdam, Germany. Sponsor: Deutsche Forschungsgemeinschaft. (F. Flechtner, GeoForschungsZentrum Potsdam, Department 1, Geodesy and Remote Sensing, c/o DLR Oberpfaffenhofen, Wessling, Germany D-82234; Tel.: +49-8153-28-1297; Fax: +49-8153-28-1735; E-mail: flechtne@gfz-potsdam.de; Web site: <http://www.massentransporte.de/?gstm07>)

This symposium will focus on progress in applications to understand the transformation of satellite sensor data to mass signals, oceanic transports, continental hydrology, ice mass balance and sea level change, and glacial isostatic adjustment, among other topics. Abstract deadline is 16 September.

■ 18–21 October 2007 **14th Meeting of the Petrology Group of the Mineralogical Society of Poland**, Bukowina, Tatrzenska, Poland. Sponsors: Mineralogical Society of Poland; University of Silesia/Earth Sciences. (J. Ciesielczuk; Tel.: +32-

3689-336; E-mail: jciesiel@wnoz.us.edu.pl; Web site: <http://www.ptmin.edu.pl/en/>)

The meeting will focus on orogenic and platform granitoids, with a session on petrology.

■ 23–27 October 2007 **International Climate and Weather of the Sun-Earth System (CAWSES) Symposium**, Kyoto, Japan. Sponsors: Scientific Committee on Solar-Terrestrial Physics (SCOSTEP); Meteorological Society of Japan; Japan Geoscience Union; others. (Conference Secretariat; E-mail: cawses07@stelab.nagoya-u.ac.jp; Web site: <http://www.stelab.nagoya-u.ac.jp/cawses/index.html>)

The symposium will cover four major themes: solar influence on climate; space weather: science and applications; atmospheric coupling processes; and space climatology.

■ 2–7 December 2007 **Sixth International Association of Hydrological Sciences (IAHS) Groundwater Quality Conference**, Fremantle, Australia. Sponsors: IAHS; Commonwealth Scientific and Industrial Research Organisation (CSIRO); International Association of Hydrogeologists (IAH); others. (V. Baker; Tel.: +61-0-8-9333-6274; E-mail: Viv.Baker@csiro.au; Web site: <http://www.clw.csiro.au/conferences/GQ07/index.html>)

With the conference theme of "Securing Groundwater Quality in Urban and Industrial Environments," focus areas include policy and controls on groundwater quality; groundwater at complex megasites; emerging chemicals of concern; biogeochemical interactions; and climate controls on groundwater quality.